CHILD DEVELOPMENT

Child Development, September/October 2020, Volume 91, Number 5, Pages 1650–1662

Patterns of Risk and Protective Factors Among Alaska Children: Association With Maternal and Child Well-Being

Anna E. Austin, Nisha C. Gottfredson, Carolyn T. Halpern, Adam J. Zolotor, and Stephen W. Marshall
University of North Carolina at Chapel Hill

Jared W. Parrish
Alaska Department of Health and Social Services

Meghan E. Shanahan
University of North Carolina at Chapel Hill

This study used population-representative data to examine associations of risk and protective factor patterns among Alaska Native/American Indian (AN/AI; N = 592) and non-Native (N = 1,018) children with maternal and child outcomes at age 3 years. Among AN/AI children, a high risk/moderate protection class was associated with child developmental risk and mothers being less likely to feel comfortable asking for help or knowing where to go for parenting information compared to a low socioeconomic status/high protection class. Among non-Native children, a moderate risk/high protection class was associated with child developmental risk and mothers being less likely to feel comfortable asking for help compared to a low risk/high protection class. Results provide insight on the intersection of risk and protective factors among Alaska families.

Converging evidence from multiple disciplines indicates that the physical, social, and emotional capabilities that develop during early childhood provide the foundation for subsequent health and development across the life course (Braveman & Barclay, 2009; Shonkoff & Garner, 2012). This knowledge has generated substantial interest in understanding the multiple, interrelated factors that influence early childhood development, including risk factors that undermine and protective factors that promote healthy developmental outcomes.

Risk and Protective Factors in Child Development

Existing research has primarily focused on understanding risk factors that compromise early development. Across multiple studies, factors such as poverty (Chaudry & Wimer, 2016), parental mental health and substance use disorders (Kingston & Tough, 2014; Walker et al., 2011), parental incarceration (Turney, 2014), violence exposure (Kitzmann, Gaylord, Holt, & Kenny, 2003; Walker et al., 2011), and maltreatment (Naughton et al., 2013) have consistently demonstrated associations with poor social, emotional, and physical developmental outcomes among children. Many of these risk factors, including poverty, parental mental health and substance use disorders, and parental

We recognize the contributions of the multiple agencies that facilitated access to the data used in this study and the individuals who provided feedback on results interpretation. We thank Kathy Perham-Hester (Alaska Pregnancy Risk Assessment Monitoring System coordinator) and Margaret Young (Alaska Child Understanding Behaviors Survey coordinator). We also thank staff from the Alaska Department of Health and Social Services, Alaska Native Tribal Health Consortium, Alaska Office of Children's Services, the Alaska Child Welfare Academy, and Alaska Resilience Initiative. The findings reported herein were performed using data collected and maintained by the Alaska Division of Public Health. The opinions and conclusions expressed are solely those of the authors and should not be considered as representing the policy of any agency of the Alaska government.

Funding: Dr. Anna E. Austin was supported by an award to the University of North Carolina Injury Prevention Research Center from the National Center for Injury Prevention and Control, Centers for Disease Control and Prevention (R49 CE002479), a training grant from the National Institute of Child Health and Development (T32 HD52468), and a grant from the Health Resources and Services Administration (R40 MC30757). Dr. Nisha C. Gottfredson is supported by a grant from the National Institute on Drug Abuse (K01 DA035153).

Conflict of interest: The authors have no potential conflicts of interest to disclose.

Financial disclosure: The authors have no financial relationships to disclose.

Correspondence concerning this article should be addressed to Anna E. Austin, 521 South Greensboro St., Carrboro, NC 27510. Electronic mail may be sent to anna.austin@unc.edu.

 0009-3920/2020/9105-0015
DOI: 10.1111/cdev.13356

incarceration, have also been found to be associated with higher levels of parental stress and lower levels of parental self-efficacy (Raikes & Thompson, 2005; Sevigny & Loutzenhiser, 2010). This is important as young children are dependent on their caregivers to meet their health and developmental needs.

While previous studies have documented associations of these individual risk factors with deficits in multiple domains of early development and parental well-being, results from several studies show that individual risk factors do not occur in isolation (Felitti et al., 1998) and that experiences of multiple, accumulating risk factors are associated with an increased likelihood of poor outcomes (Britto et al., 2017; Burke, Hellman, Scott, Weems, & Carrion, 2011; Kerker et al., 2015; Larson, Russ, Crall, & Halfon, 2008; Marie-Mitchell & O'Connor, 2013). For example, data from the National Survey of Children's Health show that the likelihood of child social and emotional problems increased as the number of risk factors the child had experienced increased (e.g., 1 vs. 0 risk factors OR = 1.52, 95% CI [1.38, 1.67]; 2 vs. 0 risk factors OR = 2.35, 95% CI [2.14, 2.58]; 3 vs. 0 risk factors OR = 3.50, 95% CI [3.16, 3.87]; Larson et al., 2008).

Less well studied are potential protective factors that promote healthy child development and parental well-being, even in the context of substantial risk. Current evidence suggests that interpersonal connections and relationships such as spending time with a father figure (Lee & Schoppe-Sullivan, 2017; Sarkadi, Kristiansson, Oberklaid, & Bremberg, 2008), engaging in activities like reading or eating a meal with an adult (Cprek, Williams, Asaolu, Alexander, & Vanderpool, 2015; Shah, Sobotka, Chen, & Msall, 2015; Walker et al., 2011), and connecting with peers through high-quality social pay (Criss, Pettit, Bates, Dodge, & Lapp, 2002; Sanders & Guerra, 2016) can function as protective factors in increasing the likelihood of healthy child development. Data from the Fragile Families and Child Wellbeing Study show that father engagement, including playing, reading, or singing with the child, attenuates the association between family poverty and child behavior problems (Lee & Schoppe-Sullivan, 2017). In addition, results from several studies indicate that among low-income children enrolled in Head Start, social play with peers is associated with improved child social and cognitive development over time (Sanders & Guerra, 2016).

Despite increasing research regarding factors contributing to early childhood development, there are gaps in knowledge. Notably, while previous studies have established that exposure to accumulating risk is associated with an increased likelihood of poor developmental outcomes, cumulative risk scores often do not indicate which specific risk factors a child has experienced. A cumulative risk score of three may indicate exposure to several different combinations of risk factors, with potentially differing implications in terms of child development and appropriate intervention. Previous studies have compared the use of cumulative risk scores and latent class analysis (LCA) for examining the effect of exposure to risk on child outcomes (Evans, Li, & Whipple, 2013; Lanier, Maguire-Jack, Lombardi, Frey, & Rose, 2018). Results from these studies demonstrate differential impacts of exposure to various combinations of risk factors on early childhood outcomes, underscoring the importance of understanding not only the total number of risk factors experienced, but the types of risk factors as well (Finkelhor, 2018). In addition, much of the existing research literature has examined risk factors in isolation from protective factors. Most research examining the role of protective factors in mitigating the risk for poor outcomes has focused on single-risk factors and examined modification of the effect of exposure to risk by the presence or absence of a given protective factor (Criss et al., 2002; McMunn, Martin, Kelly, & Sacker, 2017). Understanding associations of multiple co-occurring risk and protective factors, including which specific risk and protective factors co-occur, with child developmental outcomes can provide additional perspective on the potential impact of specific patterns of early experiences of risk and protection, with subsequent implications for prevention and intervention.

Alaska Children

To date, there has been little research regarding risk and protective factors in early development among children in Alaska, a culturally diverse population with a unique and varied history. Approximately 18% of the Alaska population identifies as Alaska Native/American Indian (AN/AI; Alaska Department of Labor and Workforce Development, 2018). The AN/AI population in Alaska has experienced prevasive intergenational and collective trauma, including separation of families and suppression of cultural identities (Alaksa Department of Health and Social Services, 2018; La Belle, Smith, Easley, & Charles, 2005). Such experiences of collective trauma influence the individual family context as well as the broader social and economic

context surrounding health and well-being among AN/AI communities (Sarche, Spicer, Farrell, & Fitzgerald, 2011). With respect to risk and protective factors, experiences of collective trauma contribute to a higher likelihood of exposure to multiple risk factors, such as poverty and parental intimate partner violence, among AN/AI compared to non-Native children (Alaksa Department of Health and Social Services, 2018; Sarche & Spicer, 2008). However, it is also increasingly recognized that there are important sources of protection and strength among AN/AI families and communities that co-occur alongside documented risks (Sarche et al., 2011). Thus, there is a need for studies that simultaneously examine risk and protective factors and their associations with indicators of development among AN/AI and non-Native children in order to inform targeted prevention and intervention to support the well-being this understudied population.

Conceptual Basis

Contemporary theories in developmental science emphasize a holistic-interactionist framework (Bergman, Cairns, Nilsson, & Nystedt, 2000). The holistic-interactionist framework provides a foundation for understanding the interplay of multiple factors in undermining or promoting development (Bergman et al., 2000). A key principle of this framework is that individual and environmental factors influence development differentially depending on the co-occurrence of other factors (Bergman et al., 2000). As such, within the context of this framework, the process of development is examined in terms of patterns of factors experienced by the individual or by groups of individuals (Cairns, Bergman, & Kagan, 1998).

Analytic methods that naturally extend from the holistic-interactionist framework include person-centered approaches to data analysis such as LCA (Bergman et al., 2000; Cairns et al., 1998). Person-centered approaches like LCA seek to understand differences among groups of individuals with respect to patterns of observed variables (Bergman et al., 2000; Laursen & Hoff, 2006). In person-centered approaches, examining patterns of factors accounts for complex, higher-order interactions between variables that likely contribute to various developmental outcomes, but that are difficult to model and interpret using traditional variable-centered approaches such as logistic regression (Bergman et al., 2000). As such, person-centered approaches like LCA provide an additional perspective on the data and an alternative way to contextualize child exposure to both risk and protective factors.

The Present Study

In a previous study, we conducted LCA to identify and summarize key patterns of risk and protective factors experienced by AN/AI and non-Native children in Alaska prior to age 3 years (Austin et al., 2019). Risk factors related to aspects of the child's early family environment and protective factors related to aspects of interpersonal relationships (Austin et al., 2019). The aim of this study was to examine the association of the previously identified latent classes of risk and protective factors with child developmental risk at age 3 years. Consistent with a two generation approach, acknowledging that young children's healthy development is inherently linked to their parents' or caregivers' well-being, we also examined the association of the previously identified latent classes with indicators of maternal stress management and help seeking.

Method

Data Sources

We used data from the Alaska Longitudinal Child Abuse and Neglect Linkage (ALCANLink) Project. ALCANLink is a linkage of 2009–2011 Alaska Pregnancy Risk Assessment Monitoring System (PRAMS; N = 3,549) data with administrative data sources including data from the Alaska Office of Children's Services (OCS; Alaska's child protective services [CPS] agency), Child Death Review, and death certificates. Each year, Alaska PRAMS samples nearly one in six live births through a stratified sample of the state's birth certificate file, with stratification by infant birthweight ($< 2{,}500$ and $\geq 2{,}500$ g) and AN/AI and non-Native status. The survey collects self-reported information from new mothers regarding preconception, prenatal, and postnatal behaviors and experiences (Shulman, D'Angelo, Harrison, Smith, & Warner, 2018). Mothers are first contacted by mail approximately 2–6 months after delivery and are re-contacted and interviewed by telephone if there is no response to repeated mailings (Shulman et al., 2018) Additional details on ALCANLink, including data sources and linkage, are provided elsewhere (Parrish et al., 2017).

We combined data from ALCANLink with data from the 2012 to 2014 Alaska Child Understanding

Behaviors Survey (CUBS; N = 1,699). CUBS is a follow-up survey to Alaska PRAMS conducted shortly after the child's third birthday that collects information from mothers about their child's health, behavior, and experiences prior to school entry. Alaska PRAMS respondents residing in Alaska at the time of CUBS administration are eligible to participate (Alaska Department of Health and Social Services, 2015). Mothers are contacted twice by mail at their child's third birthday and are then contacted and interviewed by phone if there is no response (Alaska Department of Health and Social Services, 2015). The 2012–2014 CUBS participation rate was 48% of 2009–2011 Alaska PRAMS respondents (2009–2011 Alaska PRAMS N = 3,549; 2012–2014 CUBS N = 1,699). Alaska PRAMS respondents who did not participate in CUBS include both PRAMS respondents who no longer resided in Alaska at time of CUBS administration and PRAMS respondents who resided in Alaska but declined participation. Through poststratification weights, CUBS responses are weighted to be representative of the birth population for the corresponding Alaska PRAMS year (e.g., the 2012 CUBS responses are weighted to reflect the 2009 Alaska birth population).

Measures

AN/AI Versus Non-Native Status

We categorized AN/AI or non-Native status based on maternal self-reported race on the birth certificate. For 2009–2011 births, mothers did not have the option to report multiple racial identities. For the 2012–2014 Alaska CUBS participants analyzed in this study, one-fourth were categorized as AN/AI (25.7%, 95% CI [25.1, 26.4]) and three-fourths were categorized non-Native (74.3%, 95% CI [73.6, 74.9]). Mothers of AN/AI children were an average of 25.7 years (95% CI [25.2, 26.2]) at childbirth, and 23.1% (95% CI [19.6, 26.6]) had > 12 years of education. Mothers of non-Native children were an average of 28.0 years (95% CI [27.6, 28.5]) at childbirth, and 61.0% (95% CI [56.9, 65.1]) had > 12 years of education.

Child Developmental Risk

We derived a dichotomous indicator of child developmental risk from the CUBS data. Mothers were asked whether they had concerns about how their child acts, gets along with others, or shows feelings. This indicator of child developmental risk is based on items included on the Parents' Evaluation of Developmental Status (PEDS) questionnaire, a standardized, validated tool (Glascoe, Altemeier, & MacLean, 1989; Glascoe, MacLean, & Stone, 1991). Questions on the PEDS regarding parental concerns about child behavior and social skills have been found to be predictive of child mental health problems (70%–75% sensitivity and 72%–73% specificity), to identify children with more behavior problems and lower functioning in socialization, motor, and language skills, and to be predictive of global developmental delay among young children (Glascoe, 1994, 1997, 2003; Glascoe et al., 1991). In addition, for young children, parental concerns about child development are an acceptable indicator of child developmental risk as many developmental delays and mental or behavioral health problems are not formally recognized and diagnosed until school entry (Centers for Disease Control and Prevention, 2016; King & Glascoe, 2003; Regalado & Halfon, 2001).

Maternal stress management and help seeking. We derived three dichotomous indicators of maternal stress management and help seeking from the Alaska CUBS data. Mothers were asked whether they have steps they can take to manage stress, feel comfortable asking for help when needed, and know where to go for parenting information or with concerns about child development. The questions regarding maternal stress management and help seeking were derived from the Strengthening Families framework (Harper Browne, 2014) and community-based work conducted by the Strengthening Families Alaska initiative and the Alaska Child Welfare Academy (Strengthening Families Alaska, 2016). Strengthening Families Alaska worked with parent groups to translate Strengthening Families concepts into language that resonates with Alaska parents. In addition, the Alaska Child Welfare Academy partnered with communities across Alaska, particularly in rural areas, and determined that the Strengthening Families concepts aligned with regional and traditional values and beliefs (Strengthening Families Alaska, 2016). The specific questions included on Alaska CUBS were pretested with the Alaska population to ensure face validity.

Covariates

To identify potential confounders in the association between latent class membership and the maternal and child indicators of interest, we used directed acyclic graphs (DAGs). DAGs are graphical

depictions of causal associations among variables, with associations specified based on existing empirical evidence, theoretical knowledge, and subject matter expertise (Greenland, Pearl, & Robins, 1999). We created and systematically analyzed separate DAGs for each outcome of interest (Figures S1–S4) to determine which variables should be included in analyses as covariates to control for potential confounding (Greenland et al., 1999).

Statistical Analysis

In a previous study, we conducted LCA to identify classes of AN/AI and non-Native children with distinct patterns of seven risk factors (low socioeconomic status [SES], maternal depression, maternal binge drinking, parental incarceration, intimate partner violence exposure, child exposure to violence exposure, CPS contact for suspected maltreatment), and four protective factors (father figure involvement, reading by parents, family meals, peer interactions) experienced prior to age 3 years (Austin et al., 2019). Risk and protective factor measures were based on maternal responses to questions included on CUBS, with the exception of CPS contact, which was based on records from the Alaska OCS. Specific questions used to derive risk and protective factor measures are included in Table S1. Among AN/AI children, we identified a high risk/moderate protection class (29.1%) characterized by moderate to high probabilities of several risk factors (low SES, maternal depressions, parental incarceration, violence exposure, CPS contact) and three protective factors (regular father figure involvement, family meals, and interactions with peers; Austin et al., 2019). We also identified a low SES/high protection class (70.9%) characterized by a high probability of low SES and all protective factors (Austin et al., 2019). Among non-Native children, we identified a moderate risk/high protection class (32.9%) characterized by moderate to high probabilities of low SES, maternal depression, and all protective factors (Austin et al., 2019). We also identified a low risk/high protection class (67.1%) characterized by a high probability of all protective factors (Austin et al., 2019). A test of invariance supported the need for separate latent class models for AN/AI and non-Native children, with the probability of several risk and protective factors differing among classes of AN/AI and non-Native children (Austin et al., 2019).

In this study, we used Vermunt's three-step approach (Vermunt, 2010) to examine associations of child developmental risk and maternal stress management and help seeking with the previously identified latent classes. Vermunt's three-step approach is a preferred method for examining the association of observed variables with latent classes as it accounts for the uncertainty associated with individual class membership (Vermunt, 2010). Vermunt's three-step approach generates multinomial logistic regression models that can be used to calculate adjusted odds ratios (ORs) and 95% confidence intervals (CIs) for the associations of interest. We used Vermunt's three-step approach to calculate ORs estimating the odds of each outcome for the high risk/moderate protection class compared to the low SES/high protection class among AN/AI children and the moderate risk/high protection class compared to the low risk/high protection class among non-Native children. Using estimated slopes and intercepts from the multinomial logistic regression models and the marginal frequency of each indicator of maternal and child well-being by AN/AI and non-Native status, we also calculated the predicted probability of the indicators for each latent class (Lanza & Rhoades, 2011).

We conducted data management in SAS 9.4 (SAS Institute, Cary, NC, USA) and analyses in Mplus 8 (Muthen & Muthen, Los Angeles, CA, USA). Analyses accounted for the complex sampling design of CUBS with robust standard errors. This study was approved by the institutional review board (IRB) at the University of North Carolina at Chapel Hill. Alaska PRAMS and CUBS are reviewed by the IRB at the University of Alaska Anchorage, and PRAMS is reviewed by the IRB at the Centers for Disease Control and Prevention. Researchers, practitioners, and community members, including individuals from the Alaska Native Tribal Health Consortium, the Alaska Department of Health and Social Services, the Alaska OCS, the Alaska Child Welfare Academy, and the Alaska Resilience Initiative, consulted on the design and interpretation of results from these analyses. Analyses represent a relatively exploratory effort.

Results

The prevalence of covariates, child developmental risk, and maternal stress management and help seeking are presented in Table 1. Mothers of AN/AI children were significantly younger in age at childbirth (25.7 years vs. 28.0 years) and significantly more likely to report partner stress in the 12 months prior to childbirth (31.2% vs. 24.4%), substance use (52.0% vs. 27.9%), first prenatal visit

Table 1
Prevalence of Covariates, Child Developmental Risk, and Maternal Stress Management and Help Seeking

	Alaska Native/American Indian children (N = 593)		Non-Native children (N = 1,018)		
	N or M	%[a] (95% CI)	N or M	%[a] (95% CI)	χ^2 p-value
Partner stress 12 months prior to childbirth					.0160
No	297	68.8 (64.8, 72.7)	788	75.6 (72.0, 79.2)	
Yes	183	31.2 (27.3, 35.2)	226	24.4 (20.8, 28.0)	
Financial stress 12 months prior to childbirth					.6347
No	294	51.7 (47.4, 55.9)	531	50.2 (46.2, 54.3)	
Yes	286	48.3 (44.1, 52.6)	483	49.8 (45.7, 53.8)	
Maternal substance use shortly before or during pregnancy					< .0001
No	271	48.0 (43.8, 52.3)	732	72.1 (68.4, 75.9)	
Yes	310	52.0 (47.7, 56.2)	258	27.9 (24.1, 31.6)	
Timing of first prenatal care visit					.0014
First trimester	441	73.6 (69.6, 77.6)	804	82.7 (79.2, 86.2)	
Second or third trimester or no care	135	26.4 (22.4, 30.4)	142	17.3 (13.8, 20.8)	
Maternal depressive symptoms in the 3 months post childbirth					.1921
No	440	78.9 (75.4, 82.5)	742	75.6 (72.1, 79.0)	
Yes	119	21.1 (17.5, 24.6)	257	24.4 (21.0, 27.9)	
Maternal education at childbirth					< .0001
< 12 years	122	21.8 (18.2, 25.3)	63	7.3 (4.9, 9.7)	
12 years	586	55.1 (50.9, 59.3)	246	31.7 (27.7, 35.6)	
> 12 years	147	23.1 (19.6, 26.6)	681	61.0 (56.9, 65.1)	
Maternal age at childbirth	25.7	(25.2, 26.2)	28.0	(27.6, 28.5)	< .0001
Child developmental risk					.5845
No	489	88.1 (85.3, 90.9)	870	87.0 (84.3, 89.7)	
Yes	66	11.9 (9.1, 14.7)	132	13.0 (10.3, 15.7)	
Mother has steps to manage stress					< .0001
No	125	22.0 (18.4, 25.5)	86	7.3 (5.2, 9.3)	
Yes	449	78.0 (74.5, 81.6)	922	92.7 (90.7, 94.8)	
Mother feels comfortable asking for help					.0238
No	103	18.5 (15.1, 21.9)	136	13.3 (10.5, 16.1)	
Yes	472	81.5 (78.1, 84.9)	873	86.7 (83.9, 89.5)	
Mother knows where to go for parenting information					.0056
No	39	7.0 (5.7, 9.2)	34	3.2 (1.7, 4.6)	
Yes	572	93.0 (90.8, 95.3)	969	96.8 (95.4, 98.3)	

[a]All percentages are weighted to account for the complex sampling design of the Alaska Child Understanding Behaviors Survey.

during the second or third trimester of pregnancy (26.4% vs. 17.3%), and education < 12 years (21.8% vs. 7.3%) compared to mothers of non-Native children. Mothers of AN/AI and non-Native children did not significantly differ with respect to the percent who reported child developmental risk (11.9% vs. 13.0%). Mothers of AN/AI children were significantly less likely to report having steps they can take to manage stress (78.0% vs. 92.7%), feeling comfortable asking for help when needed (81.5% vs. 86.7%), and knowing where to go for parenting information or with concerns about child development (92.0% vs. 96.8%) compared to mothers of non-Native children.

Associations of the latent classes with indicators of maternal and child well-being are provided in Table 2, and the predicted probability of these indicators for each latent class are presented in Figure 1. Among AN/AI children, the high risk/moderate protection class was associated with an increased likelihood of child developmental risk compared to the low SES/high protection class (OR = 3.72, 95% CI [1.75, 7.91]; predicted probability 0.24 vs. 0.08). The high risk/moderate protection class was also associated with mothers being less likely to report feeling comfortable asking for help when needed (OR = 0.37, 95% CI [0.18, 0.75]; predicted probability 0.71 vs. 0.87) and knowing where to go for

Table 2
Association of Latent Classes With Child Developmental Risk and Maternal Stress Management and Help Seeking

	Alaska Native/American Indian children (N = 593) High risk/moderate protection class versus low SES/high protection class OR (95% CI)	Non-Native children (N = 1,018) Moderate risk/high protection class versus low risk/high protection class OR (95% CI)
Child developmental risk[a]		
No	1.00	1.00
Yes	3.72 (1.75, 7.91)	3.22 (1.28, 8.10)
Mother has steps to manage stress[b]		
No	1.00	1.00
Yes	1.01 (0.46, 2.19)	0.32 (0.09, 1.08)
Mother feels comfortable asking for help[b]		
No	1.00	1.00
Yes	0.37 (0.18, 0.75)	0.26 (0.10, 0.69)
Mother knows where to go for parenting information[c]		
No	1.00	1.00
Yes	0.34 (0.12, 0.96)	0.38 (0.10, 1.40)

Note. SES = socioeconomic status.
[a]Adjusted for maternal age at childbirth, substance use, financial and partner stress 12 months prior to child birth, and depressive symptoms immediately post childbirth. [b]Adjusted for maternal age and education at childbirth, substance use, financial and partner stress 12 months prior to child birth, and depressive symptoms immediately post childbirth. [c]Adjusted for maternal age and education at childbirth, substance use, financial and partner stress 12 months prior to child birth, depressive symptoms immediately post childbirth, and timing of prenatal care.

parenting information or with concerns about child development (OR = 0.34, 95% CI [0.12, 0.96]; predicted probability 0.88 vs. 0.96) risk compared to the low SES/high protection class.

Among non-Native children, the moderate risk/high protection class was associated with an increased likelihood of child developmental risk compared to the low risk/high protection class (OR = 3.22, 95% CI [1.28, 8.10]; predicted probability 0.22 vs. 0.09). The moderate risk/high protection class was also associated with mothers being less likely to report feeling comfortable asking for help when needed (OR = 0.26, 95% CI [0.10, 0.69]; predicted probability 0.83 vs. 0.95).

Discussion

Informed by contemporary theories in developmental science, this study adds to a growing literature regarding factors influencing early child development by considering experiences of multiple, co-occurring risk and protective factors among young children in Alaska. Specifically, we examined associations of distinct patterns of risk and protective factors experienced by AN/AI and non-Native children with child developmental risk and maternal stress management and help seeking. Understanding such associations can provide insights for targeted, tailored interventions to promote healthy early development.

Among AN/AI children, the high risk/moderate protection class was associated with child developmental risk compared to the low SES/high protection class (predicted probability 0.24 vs. 0.08). Among AN/AI children, the high risk/moderate protection class was characterized by experiences of multiple risk factors including low SES, CPS contact for alleged maltreatment, maternal depressive symptoms, parental incarceration, and exposure to violence. In contrast, the low SES/high protection class was characterized by a single risk factor, low SES. Similar to a cumulative risk approach (Burke et al., 2011; Kerker et al., 2015; Larson et al., 2008; Marie-Mitchell & O'Connor, 2013), this result suggests that exposure to accumulating adversities during early childhood increases the likelihood of poor developmental outcomes. However, results from LCA provide additional nuance regarding key combinations and probabilities of specific risk factors and, in our analysis, protective factors. Risk factors unique to the high risk/moderate protection class and occurring at the highest probability included CPS contact, maternal depressive symptoms, and parental incarceration. This highlights the importance of efforts to simultaneously address risk factors that directly involve the child (CPS contact) as well as those involve the child's caregivers

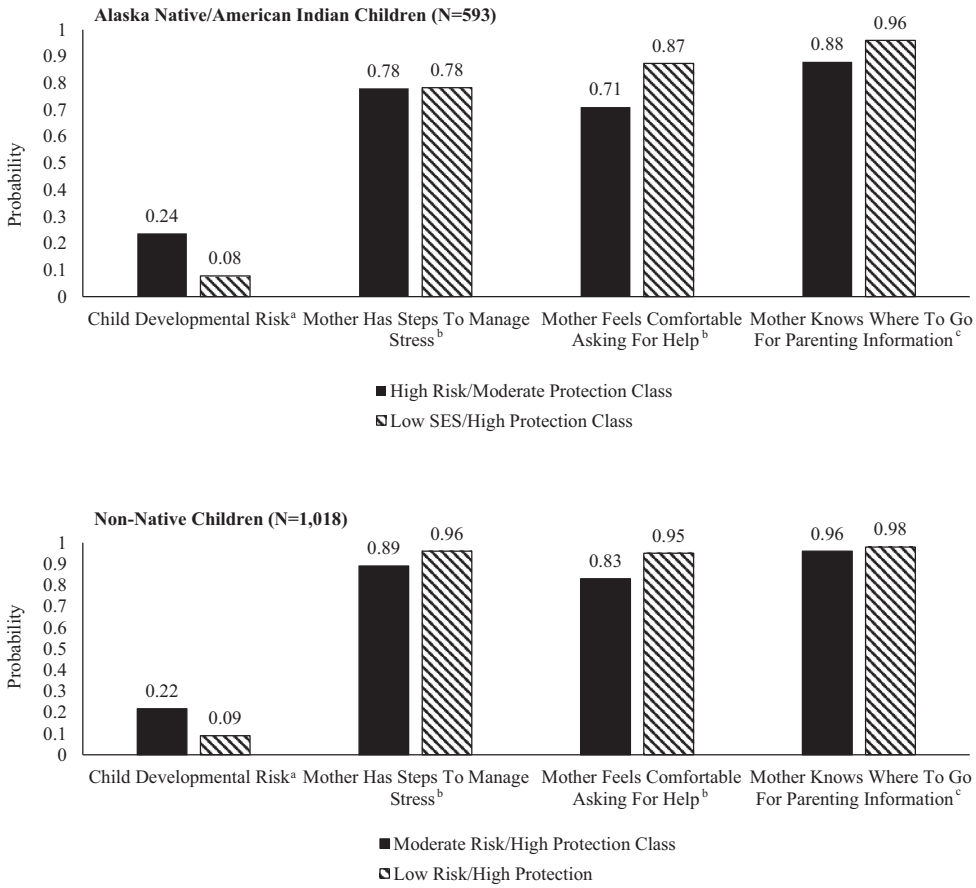

Figure 1. Probability of child developmental risk and maternal stress management and help seeking in identified latent classes. [a]Adjusted for maternal age at childbirth, substance use, financial and partner stress 12 months prior to child birth, and depressive symptoms immediately post-childbirth. [b]Adjusted for maternal age and education at childbirth, substance use, financial and partner stress 12 months prior to child birth, and depressive symptoms immediately post-childbirth. [c]Adjusted for maternal age and education at childbirth, substance use, financial and partner stress 12 months prior to child birth, depressive symptoms immediately post-childbirth, and timing of prenatal care.

(incarceration and depressive symptoms) to support to promote healthy development among AN/AI children exposed to multiple forms of risk. Of additional note is the fact that although the low SES/high protection class was characterized by a high probability of low SES, it was also characterized by a high probability of multiple protective factors and a relatively low predicted probability of child developmental risk (0.08), indicating considerable resilience despite economic hardship among this group of AN/AI children.

The high risk/moderate protection class among AN/AI children, as compared to the low SES/high protection class, was also associated with mothers being less likely to report feeling comfortable asking for help or knowing where to go for parenting information or with concerns about child development. The probability of mothers feeling comfortable asking for help was particularly low in the high risk/moderate protection class (predicted probability 0.71). Among AN/AI families, collective trauma has fostered mistrust of non-Native health and social services (Pacheco et al., 2013; Sarche et al., 2011) which may affect mothers' comfort in asking for help. Given a legacy of removal of AN/AI children from families, in the context of a high probability of involvement with the child welfare system, as observed in the high risk/moderate protection class, mothers' comfort in seeking help may be further reduced (Cross, 2014; Sarche et al., 2011). In addition, both professional and personal sources of parenting support may not be easily accessible to some AN/AI families. In Alaska, more than half of the AN/AI population live in rural communities (U.S. Census Bureau, 2010), many of which are off the main road network. Moreover, the extent to

which services are aligned with the values and traditions of the AN/AI population may also influence mothers' comfort in seeking help. Novel community-based approaches, such as community health worker initiatives (Rosenthal et al., 2010), may be needed to ensure culturally-grounded parenting support is available to AN/AI families, particularly those experiencing multiple adversities or with concerns about their child's development. In post hoc analyses, we examined the predicted probability of child enrollment in early intervention or the Infant Learning Program for each latent class. For the high risk/moderate protection class, the predicted probably was only 0.15, indicating that service use may be low in this population.

Among non-Native children, the moderate risk/high protection class was associated with child developmental risk (predicted probability 0.22 vs. 0.09) and mothers being less likely to report feeling comfortable asking for help when needed (predicted probability 0.83 vs. 0.95) compared to the low risk/high protection class. The moderate risk/high protection class among non-Native children was characterized by a high probability of low SES and a moderate probability of maternal depressive symptoms. This suggests that poverty and maternal depressive symptoms are particularly salient risk factors for poor developmental outcomes among non-Native children in Alaska. In addition, it suggests that low SES and depressive symptoms, possibly due to the stigma associated with poverty (Allen, Wright, Harding, & Broffman, 2014) and mental illness (Corrigan & Watson, 2002), may affect mothers' comfort in seeking help, even when needed. Taken together, these results indicate that poverty and maternal depression are important targets for early childhood prevention and intervention services among non-Native families in Alaska. In post hoc analyses, the predicted probability of child enrollment in early intervention or the Infant Learning program for the moderate risk/high protection class was only 0.16, again suggesting a low-level of service use in this population.

Importantly, the high risk/moderate protection class among AN/AI children and the moderate risk/high protection class among non-Native children were not only characterized by a high probability of multiple risk factors, but were also characterized by a high probability of several protective factors. In particular, there was a high probability of regularly engaging in activities such as reading or playing with a father figure and having family meals in both classes. This highlights the potential for using strengths-based approaches to engaging with Alaska families. Previous studies show that strengths-based approaches are effective in motivating caregivers to actively participate in services to address child and family needs (Crossman, Warfield, Kotelchuck, Hauser-Cram, & Parish, 2018; Green, McAllister, & Tarte, 2004; Kemp, Marcenko, Lyons, & Kruzich, 2014), particularly among families experiencing greater levels of adversity (Dishion et al., 2015). Strengths-based approaches are especially needed among the AN/AI population in Alaska where a continual focus on risk factors and poor health outcomes has contributed to "disparity fatigue" and a lack of progress in addressing risk (Thomas, Rosa, Forcehimes, & Donovan, 2011). Among AN/AI and non-Native families, acknowledging and enhancing the quality of existing protective factors, such as family meals or time spent with a father figure, may help to successfully engage caregivers in early childhood services, with subsequent benefits for both child and the caregiver well-being (Crossman et al., 2018; Green et al., 2004; Kemp et al., 2014).

Limitations

The results should be interpreted in light of several limitations. First, our indicator of child developmental risk was based on maternal self-report and thus may be influenced by maternal and family characteristics. Previous research has documented few significant differences in the accuracy of parental concerns about child social and emotional development, as measured on the PEDS, with respect to parent education, income, marital status, sex, and race, number of children in the household, and child sex, age, medical history, and participation in day care or school programs (Glascoe, 1997, 2003). Some studies suggest that parental mental health may affect the accuracy of developmental concerns, such that parents with depressive symptoms over-report child social and emotional difficulties (Smith, 2007). In all analyses, we adjusted for maternal depressive symptoms post-delivery which may account for potential effects of maternal mental health on reporting accuracy. Second, though our indicator of child developmental risk has been evaluated for validity and reliability, validity and reliability have not been specifically examined among the AN/AI population. Third, data on protective factors, including father figure involvement, family meals, and peer interactions, did not include indicators of the quality of these relationships or activities, which may have important implications for child development. In addition, protective factors

unique to the AN/AI population, such as caregivers engaging in storytelling, beading, or drumming with young children, were not included in the data sources used for this analysis (M. Castaneda, personal communication, May 14, 2018). This limitation is discussed in detail elsewhere (Austin et al., 2019). Fourth, stratification by AN/AI and non-Native status represents a crude stratification that does not capture diversity present within both populations. Even so, conducting analyses stratified AN/AI and non-Native status provides an understanding of the association of early experiences with maternal and child well-being among Alaska families, a population with considerable cultural and historical diversity that has received relatively little attention in the existing research literature. Fifth, the 2012–2014 CUBS participation rate was 48% of 2009–2011 Alaska PRAMS respondents. We compared CUBs participants and nonparticipants on several PRAMS variables. While there were some significant differences, these differences were generally small in magnitude (Table S2).

Conclusion

Results from this study underscore the role of multiple co-occurring risk and protective factors in contributing to maternal and child well-being among Alaska families. The results highlight specific targets for tailored prevention and intervention to improve early development among AN/AI and non-Native children. Importantly, the results suggest that there is potential to enhance early childhood development and support maternal well-being by simultaneously addressing risk factors and enhancing protective factors through non-stigmatizing strengths-based approaches. Future research and surveys among Alaska children and families would benefit from inclusion of risk and protective factors reflective of the unique traditions and values of the AN/AI population.

References

Alaksa Department of Health and Social Services. (2018). *Traditional health and wellness guide*. Retrieved from http://dhss.alaska.gov/Pages/Publications.aspx

Alaska Department of Health and Social Services. (2015). *CUBS*. Retrieved from http://dhss.alaska.gov/dph/wcfh/Pages/mchepi/cubs/default.aspx

Alaska Department of Labor and Workforce Development. (2018). *Current Alaska population overview*. Retrieved from http://live.laborstats.alaska.gov/pop/popestpub.cfm

Allen, H., Wright, B. J., Harding, K., & Broffman, L. (2014). The role of stigma in access to health care for the poor. *The Milbank Quarterly*, *92*, 289–318. https://doi.org/10.1111/1468-0009.12059

Austin, A. E., Gottfredson, N. C., Marshall, S. W., Halpern, C. T., Zolotor, A. J., Parrish, J. W., & Shanahan, M. E. (2019). Heterogeneity in risk and protection among Alaska Native/American Indian and non-Native children. *Prevention Science*. https://doi.org/10.1007/s11121-019-01052-y

Bergman, L. R., Cairns, R. B., Nilsson, L.-G., & Nystedt, L. (2000). *Developmental science and the holistic approach*. Hove, UK: Psychology Press.

Braveman, P., & Barclay, C. (2009). Health disparities beginning in childhood: a life-course perspective. *Pediatrics*, *124*, 136–175. https://doi.org/10.1542/peds.2009-1100D

Britto, P. R., Lye, S. J., Proulx, K., Yousafzai, A. K., Matthews, S. G., Vaivada, T., . . . MacMillan, H. (2017). Nurturing care: Promoting early childhood development. *Lancet*, *389*, 91–102. https://doi.org/10.1016/S0140-6736(16)31390-3

Burke, N. J., Hellman, J. L., Scott, B. G., Weems, C. F., & Carrion, V. G. (2011). The impact of adverse childhood experiences on an urban pediatric population. *Child Abuse & Neglect*, *35*, 408–413. https://doi.org/10.1016/j.chiabu.2011.02.006

Cairns, R. B., Bergman, L. R., & Kagan, J. E. (1998). *Methods and models for studying the individual*. Thousand Oaks, CA: Sage.

Centers for Disease Control and Prevention. (2016). *Developmental monitoring and screening*. Retrieved from http://www.cdc.gov/ncbddd/childdevelopment/screening.html#references

Chaudry, A., & Wimer, C. (2016). Poverty is not just an indicator: the relationship between income, poverty, and child well-being. *Academic Pediatrics*, *16*, 23–29. https://doi.org/10.1016/j.acap.2015.12.010

Corrigan, P. W., & Watson, A. C. (2002). Understanding the impact of stigma on people with mental illness. *World Psychiatry*, *1*, 16-20.

Cprek, S. E., Williams, C. M., Asaolu, I., Alexander, L. A., & Vanderpool, R. C. (2015). Three positive parenting practices and their correlation with risk of childhood developmental, social, or behavioral delays. *Maternal and Child Health Journal*, *19*, 2403–2411. https://doi.org/10.1007/s10995-015-1759-1

Criss, M. M., Pettit, G. S., Bates, J. E., Dodge, K. A., & Lapp, A. L. (2002). Family adversity, positive peer relationships, and children's externalizing behavior: A longitudinal perspective on risk and resilience. *Child Development*, *73*, 1220–1237. https://doi.org/10.1111/1467-8624.00468

Cross, T. L. (2014). Child welfare in Indian Country: a story of painful removals. *Health Affairs*, *33*, 2256–2259. https://doi.org/10.1377/hlthaff.2014.1158

Crossman, M. K., Warfield, M. E., Kotelchuck, M., Hauser-Cram, P., & Parish, S. L. (2018). Associations

between early intervention home visits, family relationships and competence for mothers of children with developmental disabilities. *Maternal and Child Health Journal*, *22*, 599–607. https://doi.org/10.1007/s10995-018-2429-x

Dishion, T. J., Mun, C. J., Drake, E. C., Tein, J.-Y., Shaw, D. S., & Wilson, M. (2015). A transactional approach to preventing early childhood neglect: The Family Check-Up as a public health strategy. *Development and Psychopathology*, *27*, 1647–1660. https://doi.org/10.1017/S0954579415001005

Evans, G. W., Li, D., & Whipple, S. S. (2013). Cumulative risk and child development. *Psychological bulletin*, *139* (6), 1342.

Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., . . . Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults. The Adverse Childhood Experiences (ACE) Study. *American Journal of Preventive Medicine*, *14*, 245–258. https://doi.org/10.1016/j.amepre.2019.04.001

Finkelhor, D. (2018). Screening for adverse childhood experiences (ACEs): cautions and suggestions. *Child abuse & neglect*, *85*, 174–179.

Glascoe, F. P. (1994). It's not what it seems the relationship between parents' concerns and children with global delays. *Clinical Pediatrics*, *33*, 292–296. https://doi.org/10.1177/000992289403300507

Glascoe, F. P. (1997). Parents' concerns about children's development: Prescreening technique or screening test? *Pediatrics*, *99*, 522–528. https://doi.org/10.1542/peds.99.4.522

Glascoe, F. P. (2003). Parents' evaluation of developmental status: how well do parents' concerns identify children with behavioral and emotional problems? *Clinical Pediatrics*, *42*, 133–138. https://doi.org/10.1177/000992280304200206

Glascoe, F. P., Altemeier, W. A., & MacLean, W. E. (1989). The importance of parents' concerns about their child's development. *American Journal of Diseases of Children*, *143*, 955–958. https://doi.org/10.1001/archpedi.1989.02150200115029

Glascoe, F. P., MacLean, W. E., & Stone, W. L. (1991). The importance of parents' concerns about their child's behavior. *Clinical Pediatrics*, *30*, 8–11. https://doi.org/10.1177/000992289103000101

Green, B., McAllister, C., & Tarte, J. (2004). The strengths-based practices inventory: A tool for measuring strengths-based service delivery in early childhood and family support programs. *Families in Society*, *85*, 326–334. https://doi.org/10.1606/1044-3894.1493

Greenland, S., Pearl, J., & Robins, J. M. (1999). Causal diagrams for epidemiologic research. *Epidemiology*, *10*(1), 37–48. https://doi.org/10.1097/00001648-199901000-00008

Harper Browne, C. (2014). *The strengthening families approach and protective factors framework: Branching out and reaching deeper*. Washington, DC: Center for the Study of Social Policy.

Kemp, S. P., Marcenko, M. O., Lyons, S. J., & Kruzich, J. M. (2014). Strength-based practice and parental engagement in child welfare services: An empirical examination. *Children and Youth Services Review*, *47*, 27–35. https://doi.org/10.1016/j.childyouth.2013.11.001

Kerker, B. D., Zhang, J., Nadeem, E., Stein, R. E. K., Hurlburt, M. S., Heneghan, A., . . . Horwitz, S. M. (2015). Adverse childhood experiences and mental health, chronic medical conditions, and development in young children. *Academic Pediatrics*, *15*, 510–517. https://doi.org/10.1016/j.acap.2015.05.005

King, T. M., & Glascoe, F. P. (2003). Developmental surveillance of infants and young children in pediatric primary care. *Current Opinion in Pediatrics*, *15*, 624–629. https://doi.org/10.1097/00008480-200312000-00014

Kingston, D., & Tough, S. (2014). Prenatal and postnatal maternal mental health and school-age child development: A systematic review. *Maternal and Child Health Journal*, *18*, 1728–1741. https://doi.org/10.1007/s10995-013-1418-3

Kitzmann, K. M., Gaylord, N. K., Holt, A. R., & Kenny, E. D. (2003). Child witnesses to domestic violence: A meta-analytic review. *Journal of Consulting and Clinical Psychology*, *71*, 339–352. https://doi.org/10.1037/0022-006x.71.2.339

La Belle, J., Smith, S., Easley, C., & Charles, G. (2005). *Boarding school: Historical trauma among Alaska's native people*. Anchorage AK: The National Resource Center for American Indian, Alaska Native and Native Hawaiian Elders.

Lanier, P., Maguire-Jack, K., Lombardi, B., Frey, J., & Rose, R. A. (2018). Adverse childhood experiences and child health outcomes: comparing cumulative risk and latent class approaches. *Maternal and child health journal*, *22*(3), 288–297.

Lanza, S., & Rhoades, B. (2011). *LCA outcome probability calculator*. Retrieved from http://methodology.psu.edu/ra/lcalta/calculator

Larson, K., Russ, S. A., Crall, J. J., & Halfon, N. (2008). Influence of multiple social risks on children's health. *Pediatrics*, *121*, 337–344. https://doi.org/10.1542/peds.2007-0447

Laursen, B. P., & Hoff, E. (2006). Person-centered and variable-centered approaches to longitudinal data. *Merrill-Palmer Quarterly*, *52*, 377–389. https://doi.org/10.1353/mpq.2006.0029

Lee, J., & Schoppe-Sullivan, S. J. (2017). Resident fathers' positive engagement, family poverty, and change in child behavior problems. *Family Relations*, *66*, 484–496. https://doi.org/10.1111/fare.12283

Marie-Mitchell, A., & O'Connor, T. G. (2013). Adverse childhood experiences: Translating knowledge into identification of children at risk for poor outcomes. *Academic Pediatrics*, *13*, 14–19. https://doi.org/10.1016/j.acap.2012.10.006

McMunn, A., Martin, P., Kelly, Y., & Sacker, A. (2017). Fathers' involvement: Correlates and consequences for child socioemotional behavior in the United Kingdom.

Journal of Family Issues, *38*, 1109–1131. https://doi.org/10.1177/0192513X15622415

Naughton, A. M., Maguire, S. A., Mann, M. K., Lumb, R. C., Tempest, V., Gracias, S., & Kemp, A. M. (2013). Emotional, behavioral, and developmental features indicative of neglect or emotional abuse in preschool children: A systematic review. *JAMA Pediatrics*, *167*, 769–775. https://doi.org/10.1001/jamapediatrics.2013.192

Pacheco, C. M., Daley, S. M., Brown, T., Filippi, M., Greiner, K. A., & Daley, C. M. (2013). Moving forward: Breaking the cycle of mistrust between American Indians and researchers. *American Journal of Public Health*, *103*, 2152–2159. https://doi.org/10.2105/AJPH.2013.301480

Parrish, J. W., Shanahan, M. E., Schnitzer, P. G., Lanier, P., Daniels, J. L., & Marshall, S. W. (2017). Quantifying sources of bias in longitudinal data linkage studies of child abuse and neglect: Measuring impact of outcome specification, linkage error, and partial cohort follow-up. *Injury Epidemiology*, *4*, 1–13. https://doi.org/10.1186/s40621-017-0119-6

Raikes, H. A., & Thompson, R. A. (2005). Efficacy and social support as predictors of parenting stress among families in poverty. *Infant Mental Health Journal*, *26*, 177–190. https://doi.org/10.1002/imhj.20044

Regalado, M., & Halfon, N. (2001). Primary care services promoting optimal child development from birth to age 3 years: Review of the literature. *Archives of Pediatric and Adolescent Medicine*, *155*, 1311–1322. https://doi.org/10.1001/archpedi.155.12.1311

Rosenthal, E. L., Brownstein, J. N., Rush, C. H., Hirsch, G. R., Willaert, A. M., Scott, J. R., . . . Fox, D. J. (2010). Community health workers: Part of the solution. *Health Affairs*, *29*, 1338–1342. https://doi.org/10.1377/hlthaff.2010.0081

Sanders, K. E., & Guerra, A. W. (2016). *The culture of child care: Attachment, peers, and quality in diverse communities*. New York, NY: Oxford University Press.

Sarche, M., & Spicer, P. (2008). Poverty and health disparities for American Indian and Alaska Native children. *Annal of New York Academy of Science*, *1136*, 126–136. https://doi.org/10.1196/annals.1425.017

Sarche, M. C., Spicer, P., Farrell, P., & Fitzgerald, H. E. (2011). *American Indian and Alaska Native children and mental health: development, context, prevention, and treatment*. Santa Barbara, CA: ABC-CLIO, LLC.

Sarkadi, A., Kristiansson, R., Oberklaid, F., & Bremberg, S. (2008). Fathers' involvement and children's developmental outcomes: A systematic review of longitudinal studies. *Acta Paediatrica*, *97*, 153–158. https://doi.org/10.1111/j.1651-2227.2007.00572.x

Sevigny, P. R., & Loutzenhiser, L. (2010). Predictors of parenting self-efficacy in mothers and fathers of toddlers. *Child: Care, Health and Development*, *36*, 179–189. https://doi.org/10.1111/j.1365-2214.2009.00980.x

Shah, R., Sobotka, S. A., Chen, Y.-F., & Msall, M. E. (2015). Positive parenting practices, health disparities, and developmental progress. *Pediatrics*, *136*, 318–326. https://doi.org/10.1542/peds.2014-3390

Shonkoff, J. P., & Garner, A. S. (2012). The lifelong effects of early childhood adversity and toxic stress. *Pediatrics*, *129*, 232–246. https://doi.org/10.1542/peds.2011-2663

Shulman, H. B., D'Angelo, D. V., Harrison, L., Smith, R. A., & Warner, L. (2018). The Pregnancy Risk Assessment Monitoring System (PRAMS): Overview of design and methodology. *American Journal of Public Health*, *108*, 1305–1313. https://doi.org/10.2105/AJPH.2018.304563

Smith, S. R. (2007). Making sense of multiple informants in child and adolescent psychopathology: A guide for clinicians. *Journal of Psychoeducational Assessment*, *25*, 139–149. https://doi.org/10.1177/0734282906296233

Strengthening Families Alaska. (2016). *Supporting family strengths and resiliency*. Retrieved from http://dhss.alaska.gov/ocs/Documents/2016_SF.pdf

Thomas, L. R., Rosa, C., Forcehimes, A., & Donovan, D. M. (2011). Research partnerships between academic institutions and American Indian and Alaska Native tribes and organizations: Effective strategies and lessons learned in a multisite study. *American Journal of Drug and Alcohol Abuse*, *37*, 333–338. https://doi.org/10.3109/00952990.2011.596976

Turney, K. (2014). Stress proliferation across generations? Examining the relationship between parental incarceration and childhood health. *Journal of Health and Social Behavior*, *55*, 302–319. https://doi.org/10.1177/0022146514544173

U.S. Census Bureau. (2010). *2010 Census American Indian and Alaska Native*. Summary File.

Vermunt, J. K. (2010). Latent class modeling with covariates: Two improved three-step approaches. *Political Analysis*, *18*, 450–469. https://doi.org/10.1093/pan/mpq025

Walker, S. P., Wachs, T. D., Grantham-McGregor, S., Black, M. M., Nelson, C. A., Huffman, S. L., . . . Gardner, J. M. M. (2011). Inequality in early childhood: Risk and protective factors for early child development. *The Lancet*, *378*, 1325–1338. https://doi.org/10.1016/S0140-6736(11)60555

Supporting Information

Additional supporting information may be found in the online version of this article at the publisher's website:

Figure S1. Directed Acyclic Graph of Variables Operative in the Association Between Identified Latent Classes and Child Developmental Risk

Figure S2. Directed Acyclic Graph of Variables Operative in the Association Between Identified Latent Classes and the Mother Having Steps to Manage Stress